

Monoclonal Antibody to Dnmt3a (DNA methyltransferase 3a)



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Monoclonal Antibody to Dnmt3a (DNA methyltransferase 3a)

Catalog No : IMG-268A
Formulation : 0.1 mg in 0.2ml PBS containing 0.05% BSA and 0.05% sodium azide. Sodium azide is highly toxic.
Isotype : Mouse IgG1, Kappa
Clone : 64B1446
Purification : Protein G Chromatography
Species React : Human, Mouse
Host : Mouse

Application
Western blot analysis: 2 ug/ml
IF/ICC: 5 ug/ml
ChIP: Please see Product Citations below
IHC (paraffin): Please see Product Citations below
Storage
Store at 4°C. For long-term storage, store at -20°C.

Recommended Positive Control: transfected cell lysate (WB), HeLa cells (ICC)

Background

Methylation of DNA at cytosine residues plays an important role in regulation of gene expression, genomic imprinting and is essential for mammalian development. Hypermethylation of CpG islands in tumor suppressor genes or hypomethylation of bulk genomic DNA may be linked with development of cancer. To date, 3 families of mammalian DNA methyltransferase genes have been identified which include Dnmt1, Dnmt2 and Dnmt3. Dnmt1 is constitutively expressed in proliferating cells and inactivation of this gene causes global demethylation of genomic DNA and embryonic lethality. Dnmt2 is expressed at low levels in adult tissues and its inactivation does not affect DNA methylation or maintenance of methylation. The Dnmt3 family members, Dnmt3a and Dnmt3b, are strongly expressed in ES cells but their expression is down regulated in differentiating ES cells and is low in adult somatic tissue. Recently, it has been shown that naturally occurring mutations of Dnmt3b gene occurs in patients with a rare autosomal recessive disorder, termed ICF (immunodeficiency, centromeric instability, and facial anomalies) syndrome.

Antigen

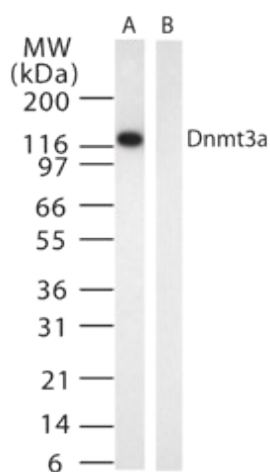
This antibody was raised against bacteria expressed recombinant mouse Dnmt3a. The epitope was found to lie near the C-terminus (a.a. 705-908), see Chen et (2002) for details.

Genebank Info (Protein)

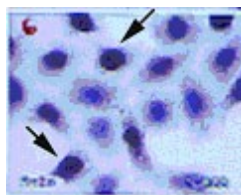
NP_715640

Genebank Info (Nucleotide)

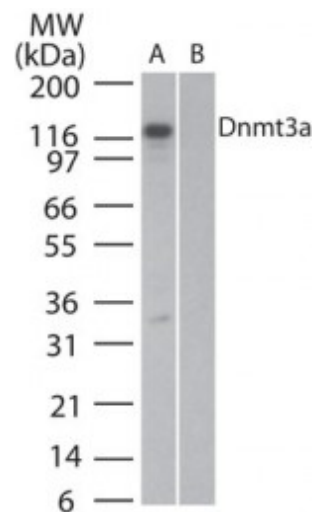
AF068625



Western blot analysis for Dnmt3a using IMG-268A at 2 ug/ml against 10 µg of 293 cell lysate transfected with either mouse Dnmt3a (lane A) or mouse Dnmt3b (lane B).



Immuno-staining of Dnmt3a using IMG-268A at 5 ug/ml dilution on cultured HeLa cells. The nucleic staining is shown in most of the cells.



Western blot analysis of Dnmt3a in (A) Dnmt3a transfected 293 cell lysate (IMGENEX, 40212) and (B) untransfected 293 cell lysate using IMG-268A at 1 ug/ml.

Related Products

- 20101 [Goat Anti-Mouse Ig HRP Conjugate]

Monoclonal Antibody to Dnmt3a (DNA methyltransferase 3a)

2. IMG-5019A-1 [Monoclonal Antibody to GAPDH - Loading Control]
3. IMG-5019A-2 [Monoclonal Antibody to GAPDH - Loading Control]

Reference

1. Xie S, Wang Z, Okano M, Nogami M, Li Y, He WW, Okumura K, and Li E. *Gene* 236: 87-95 (1999).
2. Okano M, Bell DW, Haber DA, and Li E. *Cell* 99: 247-257 (1999).
3. Reik W, Kelsey G, and Walter J. *Nat. Genet* 23: 380-382 (1999).
4. Hsieh CL. *Mol Cell Biol* 19: 8211-8218 (1999).
5. Hansen RS, Wijmenga C, Joo P., Stanek AM, canfield TK, Weemaes CM, and Gartler SM. *Proc. Natl. Acad. Sci USA* 96: 14412-14417 (1999).

Product Citations

1. **A Novel Dnmt3a Isoform Produced from an Alternative Promoter Localizes to Euchromatin and Its Expression Correlates with Active de Novo Methylation.** Taiping Chen, Yoshihide Ueda, Shaoping Xie, and En Li. *J. Biol. Chem.*, 277: 38746-38754 (2002). **Note: The epitope of Dnmt3a (Clone 64B1446, IMG-268A) was mapped by the authors to the C-terminus (amino acids 705-908), see Results section.**
2. **Lsh, a member of the SNF2 family, is required for genome-wide methylation.** Kathleen Dennis, Tao Fan, Theresa Geiman, Qingsheng Yan, and Kathrin Muegge. *Genes & Dev.*, 15: 2940-2944 (2001).
3. **Association of Lsh, a Regulator of DNA Methylation, with Pericentromeric Heterochromatin Is Dependent on Intact Heterochromatin.** Qingsheng Yan, Edward Cho, Stephen Lockett, and Kathrin Muegge. *Molecular and Cellular Biology*, 23 (23) 8416-8428 (2003).
4. **Loss of Estrogen Receptor Signaling Triggers Epigenetic Silencing of Downstream Targets in Breast Cancer.** Yu-Wei Leu, Pearly S. Yan, Meiyun Fan, Victor X. Jin, Joseph C. Liu, Edward M. Curran, Wade V. Welshons, Susan H. Wei, Ramana V. Davuluri, Christoph Plass, Kenneth P. Nephew, and Tim H-M. Huang. *Cancer Research* 64, 8184-8192 (2004). **(ChIP Assay)**
5. **De novo DNA methyltransferases Dnmt3a and Dnmt3b primarily mediate the cytotoxic effect of 5-aza-2'-deoxycytidine.** Masahiro Oka, Amy M Meacham, Takashi Hamazaki, Nemanja Rodi, Lung-Ji Chang and Naohiro Terada. *Oncogene* 24, 3091-3099 (2005).
6. **Myc represses transcription through recruitment of DNA methyltransferase corepressor.** Carmen Brenner, Rachel Deplus, Celine Didelot, Axelle Loriot, Emmanuelle Vir, Charles De Smet, Arantxa Gutierrez, Davide Danovi, David Bernard, Thierry Boon, Pier Giuseppe Pelicci, Bruno Amati, Tony Kouzarides, Yvan de Launoit, Luciano Di Croce, Francois Fuks. *The EMBO Journal* 24, 336-346 (2005).
7. **Cell and stage of transformation-specific effects of folate deficiency on methionine cycle intermediates and DNA methylation in an in vitro model.** Joanne M. Stempak, Kyoung-Jin Sohn, En-Pei Chiang, Barry Shane, and Young-In Kim. *Carcinogenesis*, 26: 981-990 (2005).
8. **Dynamic expression of de novo DNA methyltransferases Dnmt3a and Dnmt3b in the central nervous system.** Jian Feng, Hua Chang, En Li, Guoping Fan. *Journal of Neuroscience Research*, 79 (6): 734-746 (2005).
9. **Inhibition of DNA methyltransferase reverses cisplatin induced drug resistance in murine neuroblastoma cells.** Yi-Yong Qiu, Bernard L. Mirkin and Rama S. Dwivedi. *Cancer Detection and Prevention*. doi:10.1016/j.cdp.2005.05.004 online publication. **(immunofluorescence)**
10. **Stage-specific induction of DNA methyltransferases in olfactory receptor neuron development.** Jessica L. MacDonald, Christopher S.Y. Gin and A. Jane Roskams. *Developmental Biology*, In Press, Corrected Proof, Available online 8 November 2005. **(IHC on paraffin)**
11. **Roles for Dnmt3b in mammalian development: a mouse model for the ICF syndrome.** Yoshihide Ueda, Masaki Okano, Christine Williams, Taiping Chen, Katia Georgopoulos, and En Li. *Development*, 133: 1183-1192 (2006).
12. **Inhibition of IFN-γ transcription by site-specific methylation during T helper cell development.** Brendan Jones, Jianzhu Chen. *The EMBO Journal* 25, 2443-2452 (2006). **(ChIP Assay)**
13. **Maintenance of self-renewal ability of mouse embryonic stem cells in the absence of DNA methyltransferases Dnmt1, Dnmt3a and Dnmt3b.** Akiko Tsumura, Tomohiro Hayakawa, Yuichi Kumaki, Shin-ichiro Takebayashi, Morito Sakae, Chisa Matsuoka, Kunitada Shimotohno, Fuyuki Ishikawa, En Li, et al. *Genes to Cells*, 11 (7): 805-814 (2006).
14. **Abnormal CpG island methylation occurs during in vitro differentiation of human embryonic stem cells**
15. **Dnmt3a2 targets endogenous Dnmt3L to ES cell chromatin and induces regional DNA methylation.** Keisuke Nimura, Chisaki Ishida, Hiroshi Koriyama, Kenichiro Hata, Shinya Yamanaka, En Li, Kiyoe Ura, and Yasufumi Kaneda. *Genes Cells*, 11: 1225-1237 (2006).
16. **Dimethyl Sulfoxide Has an Impact on Epigenetic Profile in Mouse Embryoid Body.** Misa Iwatani, Kohta Ikegami, Yuliya Kremenska, Naka Hattori, Satoshi Tanaka, Shintaro Yagi, and Kunio Shiota. *Stem Cells*, 24: 2549-2556 (2006).
17. **Dnmt3b promotes tumorigenesis in vivo by gene-specific de novo methylation and transcriptional silencing.** Linhart H, H Lin, Y Yamada, E Moran, E Steine, S Gokhale, G Lo, E Cantu, M Ehrlich, T He, A Meissner, R Jaenisch. *Genes and Development* 21: 3110-3122 (2007). **Imgenex products cited (mouse tumor cells):**
 1. **IMG-184A (Dnmt3b): IHC (paraffin); Figs. 1C, 2A.**
 2. **Dnmt3b transgene validated in mice in Figs. 1C, 2A.**
 3. **IMG-268A (Dnmt3a): IHC (paraffin), Wb; Figs. 1C, 2A,B.**
 4. **Dnmt3a transgene validated in mice in Figs. 1C, 2A,B.**
18. **Aberrant epigenetic modifications in hepatocarcinogenesis induced by Hepatitis B virus X protein.** Park Y, B Sohn, E Yu, D Suh, Y Chung, J Lee, S Surzycki, Y Lee. *Gastroenterology* 132: 1476-1494 (2007). **Imgenex products cited (Chang liver and Hep G2 cell lines):**
 1. **IMG-261(DNMT1): WB, Figs. 1A, 4A,B.**
 2. **IMG-268A (DNMT3A): WB, ChIP, Figs. 1B, 2B, 4A,B.**
19. **Dynamic expression of DNMT3a and DNMT3b isoforms during male germ cell development in the mouse.** La Salle S and JM Trasler. *Developmental Biology* 296:71-82. (2006). Imgenex products cited for **WB (primary mouse germ cells and testes):**
 1. **DNMT3a (IMG-268A), Fig 5B (middle panel).** The antibody detected both the DNMT3a (908 aa) and DNMT3a2 (689 aa) isoforms.
 2. **DNMT3b (IMG-184A), Fig 5C (top panel).** The antibody detected multiple DNMT3b isoforms.
20. **Role of the DNA methyltransferase variant DNMT3b3 in DNA methylation.** Weisenberger DJ, M Velicescu, JC Cheng, FA Gonzales, G Liang, and PA Jones. *Molecular Cancer Res* 262-72. (2004). Imgenex products cited for **WB [wild-type mouse embryonic stem (ES) cells and ES knockouts of Dnmt3a, Dnmt3b, and 3a/b]:**
 1. **DNMT3a (IMG-268A), Fig 2A, B.** The specificity of the antibody is knockout mouse validated as it did not detect Dnmt3a in either the 3a^{-/-} (M1/3B) or 3a/3b^{-/-} (M1) mice. Dnmt3a was detected in the WT, 1^{-/-} (3A/3B) and 3b^{-/-} (M1/3A) mice as expected.
 2. **DNMT3b (IMG-184A), Fig 2A, B.** The antibody detected both the Dnmt3b1 and Dnmt3b6 isoforms. The specificity of the antibody is knockout mouse validated as it did not detect Dnmt3a in either the 3b^{-/-} (M1/3A) or 3a/3b^{-/-} (M1) mice. Dnmt3b was detected in the WT, 1^{-/-} (3A/3B) and 3a^{-/-} (M1/3B) mice as expected.
21. **Coordinate regulation of DNA methyltransferase expression during oogenesis.** Lucifero D, S La Salle, D Bourc'his, J Martel, TH Bestor and JM Trasler. *BMC Developmental Biology* doi:10.1186/1471-213X-7-36 (2007). Imgenex products cited for **WB (growing mouse oocytes and type B spermatogonia):**
 1. **DNMT3a (IMG-268A), Fig 5a, b (middle panel).** The antibody detected both the DNMT3a (908 aa) and DNMT3a2 (689 aa) isoforms.
 2. **DNMT3b (IMG-184A), Fig 5c (top panel).** The antibody detected the DNMT3b2 isoform.
22. **Helicobacter pylori regulates p21WAF1 by histone H4 acetylation.** Xia G, R Schneider-Stock, A Diestel, C Habol, S Krueger, A Roessner, M Naumann and U Lendeckel. *Biochemical and Biophysical Research Communications* 369: 526-531 (2008). **Imgenex products cited (human NCI N87 gastric carcinoma cells): WB (Fig 1)**
 1. **Dnmt1 (IMG-261).**
 2. **Dnmt3a (IMG-268)**
 3. **Dnmt3b (IMG-184)**
23. **Establishment and maintenance of genomic methylation patterns in mouse embryonic stem cells by Dnmt3a and Dnmt3b.** Chen T, Ueda Y, JE Dodge, Z Wang and E Li. *Molecular and Cellular Biology* 23:5594-5605 (2003). **WB [mouse embryonic stem (ES) cell lines and ES cells expressing various Dnmt1, 3a and 3b isoforms], Figs 1B and 7A.**
24. **Maternal and zygotic Dnmt1 are necessary and sufficient for the maintenance of DNA methylation imprints during preimplantation development.** Hirasawa R, H Chiba, M Kaneda, S Tajima, E Li, R Jaenisch, H Sasaki. *Genes and Development* 22: 1607-1616 (2008). **Imgenex antibodies cited:**
 1. **Dnmt3a (IMG-268a): IF/ICC (mouse oocytes and embryos), Fig. 1a.**
 2. **Dnmt3b (IMG-184): IF/ICC (mouse oocytes and embryos), Fig. 1c.**
25. **Multiplex RT-PCR expression analysis of developmentally important genes in individual mouse preimplantation embryos and blastomeres.** May A, R Kirchner, H Muller, P Hartmann, N El Hajj, A Tresch, U Zechner, W Mann, T Haaf. *Biology of Reproduction* DOI:10.1095/biolreprod.107.064691 (2008). **IF/ICC (mouse blastomeres), Fig. 5A.**
26. **Epigenetic silencing of CCAAT/enhancer-binding protein β activity by YY1/polycomb group/DNA methyltransferase complex.** Ko C, H Hsu, M Shen, W Chang, J Wang. *JBC* 283: 30919-30932 (2008). **Imgenex antibodies cited for HeLa cells in Fig. 7A (IF), 7B (WB following a DNA Affinity Precipitation Assay of nuclear extracts), 7C and D (ChIP): .1.**
 1. **IMG-261A (Dnmt1)**
 2. **IMG-268A (Dnmt3a)**
 3. **IMG-184A (Dnmt3b)..**

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